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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,630	03/06/2002	David S.Y. Hsu	83,661	5396

26384 7590 06/27/2002

NAVAL RESEARCH LABORATORY  
ASSOCIATE COUNSEL (PATENTS)  
CODE 1008.2  
4555 OVERLOOK AVENUE, S.W.  
WASHINGTON, DC 20375-5320

EXAMINER

CLEVELAND, MICHAEL B

ART UNIT	PAPER NUMBER
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1762

4

DATE MAILED: 06/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/090,630

Applicant(s)

HSU ET AL.

Examiner

Michael Cleveland

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 18-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Specification*

1. Applicant is reminded of the proper content of an abstract of the disclosure.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.** (The process disclosed in the abstract is that of the invention claimed in the parent application rather than that claimed in the current application).

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

3. The priority information in the first paragraph should be updated by adding a phrase such as “, now U.S. Patent 6,402,985,”.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 18-28 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure as originally filed supports the concept of repeating steps (d) and (e) (for claim 28, (k) and (l)) until a thickness is achieved (e.g., p. 12, lines 12-p. 13, line 2; Examples 1 and 2), but does not provide support for the concept of repeating steps (a)-(c) (or (h)-(j)).

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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7. Claims 18-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 18 and 28: The phrase "repeating...as needed" is vague because it is not clear whether or not repetition is necessary to fulfill the claim limitation. If so, it is further unclear whether each of the steps must be repeated the same number of times. (For example, does the claim encompass making two batches of coating compositions by the process of steps (a)-(c) and using them to apply four layers on a substrate by the method of (d) and (e)?) For purposes of applying art, the claim was treated as including both the possibility that no repetition is necessary if the desired film thickness is achieved by a single coating and the possibility that the steps (a)-(e) need not each be repeated the same number of times.

Claim 28: The phrase "steps (a) through (e)" lacks proper antecedent basis because no such steps are claimed.

#### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claim 18, 25-26, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Haluska et al. (U.S. Patent 5,635,249, hereafter '249).

'249 teaches

- a) providing a solution comprising an alkoxide precursor (the product of (c) below) (col. 2, lines 26-42) and a dopant precursor (col. 3, lines 7-15);
- b) mixing said solution with a solid particle precursor (col. 3, line 66-col. 4, line 7);
- c) inducing a sol-gel condensation reaction to form a sol-gel condensation reaction mixture (col. 2, lines 35-38);
- d) spreading the sol-gel mixture on a substrate (col. 4, lines 64-67);
- e) drying the sol-gel reaction mixture (col. 5, lines 4-12);

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f) producing a desired thickness of film (col. 4, lines 8-22) (While there is no indication that any repetition of steps (a)-(e) is required to produce the desired thickness, the claim indicates that repetition is only required *as needed*. See rejection under 35 USC 112, 2<sup>nd</sup> paragraph, above.); and

g) heating the thick film (col. 5, lines 18-26).

Claim 25: The dopant precursor may be tetraisobutoxy titanium, an alkoxide (col. 3, lines 16-30).

Claim 26: The solid particles may be zinc sulfide (col. 3, line 66-col. 4, line 7).

Claim 28: The particle size may be 10 microns (10,000 nm) (col. 4, lines 14-22).

The process produces a phosphor layer on a substrate (i.e., a multilayer phosphor product on a substrate).

### ***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 18-21, 23-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haluska '249 and Levene (U.S. Patent 3,927,224, hereafter '224) in view of each other.

'249 is described above. It teaches the formation of a sol-gel reaction mixture, the spreading of the mixture on the substrate, and the dry and firing of the mixture to form a

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phosphor-coated substrate. It does not explicitly teach the inclusion of a hydrolysis agent during the formation of the sol-gel reaction mixture.

‘224 teaches

a) providing a solution comprising an alkoxide precursor (col. 2, lines 42-52) and a dopant precursor (col. 2, lines 53-56);

b) mixing said solution with a solid particle precursor (col. 2, lines 62-66; col. 3, line 64-col. 4, line 18);

c) inducing a sol-gel condensation reaction to form a sol-gel condensation reaction mixture (col. 2, lines 56-62; col. 6, lines 51-61).

It also teaches e) drying the condensation reaction mixture (col. 6, line 63-col. 7, line 68) and g) heating to form a glass with a phosphor dispersed therein on a substrate (col. 7, lines 11-31). However, it appears that the sol-gel reaction mixture is first fired to form granules of phosphor dispersed in glass, and then mixed with another solvent, and applied to the substrate (col. 7, lines 11-31). Therefore, ‘224 does not teach that the sol-gel condensation reaction mixture is spread on a substrate.

Taking the references as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied the sol-gel condensation reaction mixture of ‘224 directly to the substrate before drying and firing with a reasonable expectation of success because ‘249 demonstrates that sol-gel condensation reaction mixtures may be directly applied to substrates before drying and firing and because one of ordinary skill in the art would have recognized that the process of ‘249 uses fewer steps (applying, drying, and firing) than that of ‘224 (drying, firing, redispersing in solvent, applying, drying, and firing) and would therefore have been more efficient. Also, ‘249 does not give any particular guidance on the order of mixing to produce sol-gel condensation reaction mixtures containing phosphor particles. ‘224 gives specific method operative to produce such mixtures. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the method of ‘224 to have produced the sol-gel condensation reaction mixture of ‘249 with a reasonable expectation of success and with the expectation of similar results because ‘224 demonstrates that its method is operative to produce a sol-gel condensation mixture.

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Claims 19 and 23: '224 teaches that the solution may contain water, a hydrolysis agent (col. 2, lines 45-52; col. 5, lines 28-60).

Claims 20-21 and 24: '224 teaches that the particles may be added in any of its steps (1)-(3) prior to gelling in step (3) (col. 2, lines 56-65). '224 also teaches that the addition of water, a hydrolysis agent, causes the gelling in step (3) (col. 2, lines 56-62 and col. 6, lines 52-61). Thus, it is clear that the water is added after the particles because the particles are to be added before gelling, and that the hydrolysis agent, water, is added immediately before the gelling condensation reaction because it causes the condensation reaction.

Claims 25-26 and 28: See also discussion of '249 above.

13. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haluska '249 and Levene '224 in view of each other, as applied to claim 18 and further in view of Kilian et al. (U.S. Patent 5,622,750, hereafter '750).

'249 and '224 are discussed above. They do not explicitly state that a reagent capable of inhibiting condensation reactions is included in the solution before adding the particles. However, '224 does teach that it is desired to add particles before the sol is gelled (col. 3, lines 62-65).

'750 teaches the inclusion of an acid as a catalyst that promotes hydrolysis but keeps gelling from occurring too quickly in silicon oxide precursor solutions (col. 3, lines 54-56). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added such an condensation inhibiting agent to the solution of '224 before the particles are added in order to have promoted the hydrolysis of step (1) while slowing down gellation of the sol until the particles could have been added.

14. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haluska '249 and Levene '224 in view of each other, as applied to claim 18 and further in view of Francis et al. (U.S. Patent 4,517,037, hereafter '037).

'249 and '224 are discussed above. '249 teaches that the sol-gel condensation reaction may include other fillers besides the phosphor filler, such as silica (col. 3, lines 49-65). However, the references do not teach the inclusion of fumed silica.

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'037 teaches the use of fumed silica as a filler in compositions containing silica sol binders, which are similar to and compatible with the precursor sol of '249 (see, e.g., '249, col. 1, lines 19-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used fumed silica as the particular type of silica filler of '249 with a reasonable expectation of success because '037 teaches that fumed silica is a useful filler for silica sols.

### *Conclusion*

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fratello et al. (U.S. Patent 4,965,091), Chadha et al. (U.S. Patent 5,695,809), Torikoshi et al. (U.S. Patent 5,643, 685), and de Leeuw et al. (U.S. Patent 4,931,312) all teach sol-gel methods of depositing luminescent coatings. Note that each teaches the repetition of coating and drying to form a desired thickness ('091: col. 3, lines 53-56; '809: Fig. 2; '685, col. 5, lines 66-67; '312, col. 4, lines 43-48).

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703) 308-2331. The examiner can normally be reached on 9-5:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 306-3186 for regular communications and (703) 306-3186 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



MBC  
June 17, 2002

  
**MICHAEL BARR**  
**PRIMARY EXAMINER**